WHAT IS CLAIMED IS:

1. An array antenna reception apparatus comprising: an array antenna having M (M is an integer of not less than 1) antenna elements linearly laid out on each side

5 (sector) of a polygon having K , (K is an integer of not less than 3) sides; K adaptive receivers each for receiving reception signals from the M antenna elements for a corresponding sector, independently forming a directional pattern having a gain in a desired signal

10 direction for the sector, receiving a desired signal, and suppressing an interference signal; and a demodulated signal synthesizer for receiving K demodulated signals as outputs from said K adaptive receivers, weighting and synthesizing the signals, and outputting a demodulated

15 signal for a user.

2. An apparatus according to claim 1, wherein the directional pattern of each sector of said array antenna is formed outside each side of the polygon.

3. An apparatus according to claim 1, wherein said

20 demodulated signal synthesizer selects a demodulated signal having maximum desired signal power in weighting and synthesizing the K demodulated signals.

4. An apparatus according to claim 1, wherein said demodulated signal synthesizer selects a demodulated

25 signal having a maximum ratio of desired signal power to

interference power in weighting and synthesizing the K demodulated signals.

5. An apparatus according to claim 1, wherein said demodulated signal synthesizer performs weighting synthesis (maximum ratio synthesis) so as to maximize a ratio (SIR) of desired signal power to interference power in weighting and synthesizing the K demodulated signals.

6. An apparatus according to claim 1, wherein each of said K adaptive receivers comprises M despread means for receiving code division multiple access (CDMA) signals received by said M antenna elements and a determination symbol obtained by hard determination for the demodulated signal for a user, and despreading each of the M antenna reception signals using a desired user spread code, a weighting synthesizer for forming a directional pattern, a demodulator for estimating a transmission path, a multiplier for multiplying a user determination symbol by a complex transmission path estimation value as an output from said demodulator to cancel a phase change caused by phase lock of a carrier wave, a subtracter for subtracting an output from said weighting synthesizer from an output from said multiplier to detect an antenna weight control error, delay means for delaying outputs from said M spread means in accordance with a processing time of said demodulator, and antenna weight control means for

controlling and outputting antenna weights on the basis of a least mean square error (MMSE) so as to minimize average power of the antenna weight control error using outputs from said delay means and the antenna weight control error.

5   7. An apparatus according to claim 1, wherein each of said K adaptive receivers comprises M despread means for receiving code division multiple access (CDMA) signals received by said M antenna elements and despreading each of the M antenna reception signals using a desired user

10 spread code, arrival direction estimation means for estimating an arrival direction from outputs from said M despread means, antenna weight generation means for generating antenna weights from outputs from said arrival direction estimation means, a weighting synthesizer for

15 forming a directional pattern from the antenna weights, and a demodulator for estimating a transmission path.

    8. An apparatus according to claim 6, wherein said weighting synthesizer comprises M complex multipliers for receiving the M antenna reception signals and the antenna

20 weights, and multiplying the received signals by M complex antenna weights, and an adder for adding outputs from said M complex multipliers.

    9. An apparatus according to claim 6, wherein said demodulator comprises transmission path estimation means

25 for receiving an output from said weighting synthesizer

and estimating an amplitude and phase of the carrier wave, complex conjugate operation means for obtaining a complex conjugate of a complex transmission path estimation value as an output from said transmission path estimation means,

5   and a multiplier for multiplying an output from said despread means by an output from said complex conjugate operation means to phase-lock the carrier wave.